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A GRADED COURSE IN SCHOOLROOM GYMNASTICS. V

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GRADE I

THE ORGAN GRINDER

Story—The hand-organ man goes pushing his organ up one street and down another until he stops before the house of some child. Here he grinds out tunes for the children, who give pennies to his monkey. The monkey politely bows in acknowledgment of each gift. The children dance merrily to the music and stop out of breath.

Exercises:

1. Pushing the organ.
   Purpose: Good carriage and rhythm.
   Signals: A. Hands on handle.
   Hold hands up in front of shoulders, well apart.
   B. Ready—go!
   Children march round room briskly, with erect posture, pretending to push (full-sized) organ.
2. Playing the organ.
   Purpose: Arm muscles, chest correction, rhythm.
   Signals: A. With left (or right) hand take hold of crank.
   Hold hand up at side, elbow bent.
   B. Ready—play!
   Arm describes the largest circle the child can make, moving first upward then backward, then downward, then forward. This may well be done in time to some popular air which the children may hum.
3. Giving pennies to the monkey.
   Purpose: Back and leg exercise.
   Signals: A. Down. Reach down with left (or right) hand, bending knees, and bending forward at hip joint with back straight.
   B. Up. Quickly spring to straight standing position.

4. Bowing of the monkey.
   Purpose: Practice in straight standing position.
   Signals: A. Hand on cap.
   Raise right hand to head.
   B. Bow.
   Nod head quickly, and make quick motion of arm as if pulling off and replacing cap.
   Repeat bowing as many times as there were pennies given to the monkey.

5. Dancing of the children.
   Purpose: General exercise.
   Signal: Ready—skip!
   Children join hands by rows, and each row skips sideways about the room.

6. Panting.
   Purpose: Full breathing.
   Signals: A. Breath in.
   B. Breath out.

GRADE II

Soldiers at Drill

Story—The soldiers march about the parade ground saluting their officer as they pass him. They raise the flag and give it a hearty cheer, and then go through with their rifle practice. At the end of the drill the bugle is blown and they march from the parade ground in double quick time.

Exercises:

1. Marching about the parade ground.
   Purpose: Good carriage and rhythm.
   Signals: A. Left (or right) shoulder—arms!
   Bend hand up at side, arm held close to body, hand at shoulder height.
   B. Forward—march!
   March briskly about room with erect posture.
   One child may stand in a chair as officer of the day; in passing him each child will salute by raising the free hand to the forehead and dropping it again immediately. It is best to arrange the march so that the free hand will be on the side toward the officer.
   C. Stack arms. Pretend to lean rifles against desks after the marching.

2. Raising the flag.
   Purpose: Correction of chest, and arm exercise.

Signals: A. Hands on rope.
Hands in front of body, one above the other.
B. Pull. Bring the upper hand *strongly* down till it rests on the lower one.
C. Reach. Remove the lower hand and reach high up with it.

3. Three cheers for the flag.
Purpose: Correction of chest, arm exercise.
Signals: A. With left (or right) hand take caps or handkerchiefs.
Boys remove imaginary caps from heads, girls hold up imaginary handkerchiefs.
B. One! Two! Three!
At each count wave hand in *large* circle and shout, "Hurrah!" in a stage whisper.

4. Target Practice.
Purpose: Trunk and leg exercise.
Signals: A. Right shoulder—arms!
As before.
B. On left (or right) knee—down!
Kneel with back erect and hands holding rifle out in front.
C. Aim!
Bend forward at hip joint and take aim by sighting along bore of gun.
D. Fire!
Quickly spring back to erect kneeling position, pulling right hand back (pulling trigger) and saying, "Bang!" Repeat Aim! and Fire!
E. Stand—up! Spring to standing position with gun at "Right shoulder arms."

5. Bugle call.
Purpose: Full breathing.
Signals: A. Take bugle in left (or right) hand.
Hold half-closed hand up in front to represent bugle.
B. Breathe.
C. Blow.
Holding bugle to mouth sing some simple bugle call with the syllable, "loo," using only one breath for entire call. "I can't get 'em up," though inappropriate in sentiment, is good because short.

6. Running.
Purpose: General exercise.
Signals: A. Right shoulder—arms!
B. Double quick—march!
Children run around room to seats.

GRADE III

LESSON VII

1. Introductory. One step forward and backward—march!
   One step backward and forward—march!
   Class counts 1, 2! 1, 2! in responding to each command. Introductory exercises from previous lessons may also be used at random in order to exact alert attention from the children.
2. Arch. *Hips—firm! Head to left—twist!* Head twisting all the way—1! —2! *Head forward—twist! Po—sition!*
   1. Twist head from left to right. 2. From right to left.
3. Arm. Shoulders—firm! Arm flinging sideways—1!—2! Po—sition! The same in four counts—go!
   1. Shoulders—firm position. 2. Fling arms sideways with palms up and elbows straight at shoulder height. 3. Shoulders—firm position. 4. Fundamental standing position.
4. Trunk. *Hips—firm!* Trunk to left—twist! Forward—twist! To right, etc. *Po—sition.*
5. Jump. *Hips—firm! Left foot backward—raise!* Running in place, ten counts—go! *Po—sition!*
   See Grade IV, Lesson IV.
6. Respiratory. Arm raising sideways upward—raise!—sink!
   Arms move in side plane, rotating smoothly while moving so that palms face each other when arms are up.

GRADE III

LESSON VIII

1. Introductory. Two steps forward and backward (or backward and forward) —march!
   Children count 1, 2, 3! 1, 2, 3! Use introductory exercises from previous lessons at random in order to exact alert attention from children.
2. Arch. *Hips—firm!* Neck backward—bend! Upward—raise! *Po—sition!*
   Bend neck backward till face looks toward ceiling. In raising head arch the neck strongly so as to set it far back between shoulders; push neck back against collar and pull chin in.
3. Arm. *Chest—firm!* Arm flinging sideways—1!—2! *Po—sition!* See Grade IV, Lesson VI.
4. Trunk. Shoulders—firm! Trunk forward—bend! Upward—raise! Po—sition! The same in four counts—go!
   In responding to the last command the children should count aloud.
5. Jump. *Hips—firm! Left leg sideways—raise!* Jump changing feet counting to ten—go! *Po—sition!* See Grade IV, Lesson V.

6. Respiratory. *Arms sideways—raise! Hands—turn!* Arm raising upward with deep breathing—1!—2! *Po—sition!*
   1! Inhale while raising arms to full height. 2! Exhale while lowering them to height of shoulders.

GRADE IV

LESSON VII

1. Introductory. Review left and right facings and the march steps given in previous lessons, and require alert attention of the children by varying the commands instead of repeating the same exercise.
2. Arch. *Hips—firm!* Neck backward—bend! Upward—raise! *Po—sition!* See Grade III. Lesson VIII.
3. Arm. *Neck—firm!* Arm flinging sideways—1!—2! Etc. *Po—sition!* 1! Fling arms sideways to horizontal plane, thumbs up. 2! Neck-firm position.
4. Leg. *Hips—firm!* Foot placing sideways with heel raising and change of feet—go! *Po—sition!* Children count to eight. 1. Place left foot sideways. 2. Raise heels high. 3. Lower heels. 4. Replace foot. 5–8. Same with right foot.
5. Trunk. Hips—firm! Trunk forward—bend! Neck—firm! Hips—firm! Trunk—raise! Po—sition!
   The same in six counts—go!
6. Jump. *Hips—firm! Left foot backward—raise!* Running in place with extra hop ten counts—go! *Po—sition!*
   Children count 1, and, 2, and, etc. 1. Left foot goes down and right foot up behind. And. Hop on left foot. 2. Right foot goes down and left foot up behind. And. Hop on right foot, etc.
7. Respiratory. *Arms sideways—raise! Hands—turn!* Arm raising upward —1!—2! *Po—sition!*
   1. Inhale while raising arms to full height. 2. Exhale while lowering them to shoulder height.

GRADE IV

LESSON VIII

1. Introductory. Left about—face! Right about—face!
   Technique is the same as in left and right facing, but the turn is 180° instead of 90°.
2. Arch. *Hips—firm!* Head to left—twist! To left—bend! Upward—raise! Forward—twist! To right, etc. To left—bend! With head held sharply twisted take a deep breath and bend head and neck over toward back of body without bending shoulders backward. This is called to-left—bend because the head bends toward its own left side.

3. Arm. *Head—firm!* Arm flinging to star position—1!—2! *Po—sition!* Star position. Arms extended diagonally upward from shoulders in side plane.
4. Leg. *Hips—firm!* Foot placing forward and backward with change of feet—go! *Po—sition!* Children count to eight. 1. Place left foot forward. 2. Replace it. 3. Place it backward. 4. Replace it. 5–8. The same with right foot.
5. Trunk. *Left hip, right neck—firm!* Trunk to left—bend! Upward—raise! etc. *Arms—change!* Trunk to right, etc.
6. Jump. Hips—firm! Left leg sideways—raise! Jump changing feet with extra hop counting to ten—go!
   Put the extra hop in as in Lesson VII.
7. Respiratory. Arm turning—1!—2!
   See Lesson IV.

GRADE V

Lesson VII

1. Introductory. Mark time—march! Class—halt!
   Bend knee well up in front and land, toes first, at each count. Brisk time. At the command "Class—halt!" the class takes two more steps and halts.
2. Arch. Chest—raise! Return! See Grade VI, Lesson II.
3. Arm. *Left arm sideways, right arm upward stretching—1!—2!* Arm changing —1!—2! *Arm stretching downward—1!—2!*
   Arm changing—1! Shoulders-firm position. 2! Stretch arms in opposite direction.
4. Leg. *Hips—firm!* Heel raising and knee bending three times (or more) —go! *Po—sition!*
   To be taken in 4 counts. 1. Raise heels. 2. Bend knees. 3. Stretch knees. 4. Lower heel.
5. Balance. *Neck—firm! Left leg backward—raise!* In two counts feet—change. *Po—sition!*
   Foot changing. 1. Replace raised foot on floor. 2. Raise other foot.
6. Abdominal. *Head firm and feet—close!* Trunk to left (or right)—bend! Upward—raise! *Po—sition!*
   Head—firm! Tips of fingers meet on crown of head, wrist curved upward, elbows back.
7. Back. *Chest—firm! Trunk forward—bend!* Arm flinging sideways—1! —2! *Trunk—raise! Po—sition!*
   In flinging the arms they should be carried up over the shoulders rather than backward.
8. Jump. Jump with left (or right) facing—1!—2!—3, 4!—5!—6!
   3, 4! Make a quarter circle turn in the jump.
9. Arm raising sideways and heel raising—raise!—sink!
   Raise arms to height of shoulders.

GRADE V

LESSON VIII

1. Introductory. Mark time—mark! Forward—march! Class—halt! At command "forward—march" the children step forward on the next count after the word "march," and march lightly round the room until they hear the next command, which may be either "Class—halt" or "Mark time —mark." If the former, they come to a halt in two counts; if the latter, they immediately begin to mark time in place until another command is given.

2. Arch. *Hips firm and feet sideways—place!* Chest—raise! Re—turn! *Po—sition!*
   Children jump to feet-sideways-place position in one count.

3. Arm. Arm stretching forward—1!—2! Arm stretching downward—1!—2!
   This stretching may be done in any one of five directions at will: forward, backward, upward, sideways, or downward. In the backward stretching the arms are extended as far back of the fundamental position as can be done without tipping the body forward.

4. Leg. *Hips—firm!* Foot placing forward with heel raising and change of feet. *Po—sition!*
   Children count to 8. 1. Place left foot forward. 2. Raise heels high. 3. Lower heels. 4. Replace foot. 5–8. Same with right foot.

5. Balance. *Hips—firm! Left knee upward—bend!* In one count feet—change. *Po—sition!*
   Change feet in one count with a little jump, and hold new position steadily.

6. Abdominal. *Arms forward upward fling and feet—close!* Trunk to left (or right)—twist! Forward—twist! *Po—sition!*
   Arms forward upward fling. Arms are swung through the forward plane up to their greatest height and are held strongly stretched during the movement.

7. Back. *Arms sideways—raise! Hands—turn! Trunk forward—bend!* Arm flinging upward—1!—2! *Trunk—raise! Po—sition!*
   In the arm flinging note three points: trunk must be kept down, head must be kept up, and arms flung so far up that the child cannot see his own hands.

8. Jump. *Hips—firm!* Jump forward—1!—2!—3, 4!—5!—6! *Po—sition!* 3, 4! Jump forward clearing about a foot of floor space.

9. Respiratory. Arm raising forward upward and sinking sideways downward—Raise!—Sink!
   Raise! Inhale while raising arms through the forward plane to their greatest height, palms facing each other. Sink! Exhale while lowering arms in side plane turning palms as they descend.

GRADE VI

LESSON VII

1. Introductory. Stretching exercises, three times each—go!
   This movement consists of three vigorous stretches with the arms in the side plane at height of shoulders, three vigorous stretches to the greatest height the arms can reach accompanied by heel raising, three extreme forward bendings of the trunk touching the floor with finger tips if possible, and three deep squats with extreme bending of knees and back erect. The counts may be 1, (stretch arms sideways), And, (relax), 2, And, 3, And, (raise arms high above head); 1, (stretch arms up and raise heels), And, (relax arms slightly and lower heels), 2, And, 3, And; 1, (bend trunk forward downward in necessarily slower rhythm), And, (raise trunk to erect position with arms over head), 2, And, 3, And, (raise trunk to erect position and drop arms at sides); 1, (deep squat), And, (erect standing position), 2, And, 3, And, (erect standing position should be held in military fashion).
   This exercise takes the place in warmer weather of the running exercise which was done in the winter.
2. Arch. *Shoulders—firm!* Head to left—twist! to left—bend! upward—raise! forward—twist! to right, etc.
   See Lesson III.
3. Arm. Arm stretching forward—1!—2! Arm stretching downward—1!—2!
   This stretching may be done in any one of five directions at will: forward, backward, upward, sideways, and downward. In the backward stretching the arms are extended as far back of the fundamental position as can be done without tipping the body forward.
4. Leg. *Hips—firm!* Kneeling position on left (or right) knee—1!—2! Standing position—1!—2! The same in four counts—go! *Po—sition!*
   1. Stretch left leg backward and touch toe to the floor as far back as possible without tipping the body forward.
   2. Kneel on left knee with back erect.
   3. Rise retaining backward stretched position of left leg.
   4. Replace foot.
5. *Hips—firm! Left leg sideways—raise!* By jumping, feet—change! *Po—sition!*
   Hold position steadily after each change.
6. Abdominal. *Neck firm and feet—close!* Trunk to left (or right)—twist! Forward—twist! *Po—sition!*
7. Back. *Shoulders—firm! Trunk forward—bend!* Arm stretching upward, —1!—2! *Trunk—raise! Po—sition!*
   Note three points to be observed during arm stretching: trunk should be kept down, head up, and arms stretched so far upward and backward that child cannot see his own hands.

8. Jump. *Hips—firm!* Jump with left (or right) facing—1!—2!—3, 4!—5!—6!
   3, 4! make a quarter circle turn while jumping.
9. Respiratory. *Arms sideways—raise! Hands—turn!* Arm raising and heel raising—raise!—sink! *Po—sition!*
   Lower arms to horizontal position at the word "sink."

GRADE VI

LESSON VIII

1. Introductory. Stretching exercises three times each—go!
   See Lesson VII.
2. Arch. *Neck—firm!* Chest—raise! Re—turn! *Po—sition!*
3. Arm. *Left arm backward, right arm upward stretching*—1!—2!
   Arm changing—1!—2!
   The direction in which arms are to be stretched may be changed at will of teacher, who may choose any two of the five possible directions.
4. Leg. Shoulders firm and heels—raise! Arms sideways stretch and knees—bend. Shoulders firm and knees—stretch! Po—sition! The same in 4 counts—go!
5. Balance. *Hips—firm!* Left knee (or right) upward—bend! Knee sideways—move! Forward—move! Foot re—place! *Po—sition!*
   Knee sideways—move! Keeping knee at height of hip move it toward the side without twisting shoulders.
6. Abdominal. *Hips—firm! Double kneeling position—1!—2!*
   Trunk backward—bend! Upward—raise! *Standing position!—1!—2! Po—sition!*
   Double kneeling position—1! Kneel on left knee—2! Kneel on both. Standing position—1! Place left foot forward on floor—2! Rise to standing position.
   The bending should be done in the knee joint; the spine should go back as one straight section with chest up and head back. Be especially careful that chest does not grow hollow and that hip joint does not bend.
7. Back. *Arms sideways—raise! Trunk forward—bend!* Arm swimming—1!—2!—3!
   For arm swimming see Lesson V.
8. Jump. Jump forward with forward flinging of arms—1!—2!—3, 4!—5!—6!
   3, 4! Jump forward clearing about a foot of floor space and assist the jump by swinging the arms forward in jumping and lowering them to the sides in landing.
9. Respiratory. Arms circling and heel raising—raise!—sink!
   Raise! Inhale and swing arms forward upward to their full height and raise heels.
   Sink! Exhale and lower arms sideways downward and lower heels.

GRADE VII

LESSON VII

1. Introductory. Stretching exercises, three times each—go!
   See Grade VI, Lesson VII.
2. Arch. *Hips firm and left foot forward—place!* Chest—raise! Re—turn! *Feet—change!* Chest, etc.
   During the raising of chest keep weight well forward.
3. Arm. *Left arm backward, right arm upward stretching*—1!—2! Arm changing—1!—2! *Arm stretching downward*—1!—2!
   Any two directions may be chosen out of the five possible ones: forward, backward, upward, sideways, or downward. Backward: the arms are extended as far back of the fundamental position as can be done without tipping body forward.
4. Abdominal. *Left hip firm and right arm forward upward—fling!* Trunk to left—bend! Upward!—raise! *Arms—change!* Trunk to right, etc. *Po—sition!*
5. Back. *Shoulders firm and feet sideways—place! Trunk forward—bend!* Arm stretching upward—1!—2!—1!—2! *Upward—raise! Po—sition!*
   The same in eight counts—go!
   For special points see Grade V, Lesson VIII.
6. Respiratory. *Arms forward—raise!* Arm raising upward and heel raising—raise!—sink! *Po—sition!*
   Sink! To shoulder height.
7. Balance Steps. Combine four forward slides with two forward polka steps. Four slides beginning with left foot, polka step beginning right, polka step beginning left, four slides beginning with right foot, polka beginning with left, polka beginning with right.

GRADE VII

LESSON VIII

1. Introductory. Stretching exercises, three times each—go!
2. Arch. *Chest—firm!* Neck firm and chest raising—1!—2! *Po—sition!* 1. Neck firm and chest raise. 2. Chest firm and return.
3. Arm. Arm stretching forward, upward and downward—1!—2!—1!—2! —1!—2!
   Any three directions may be used at will of teacher, requiring alert attention of children.
4. Leg. *Shoulders—firm!* Foot placing forward and backward with heel raising and change of feet—go! *Po—sition!*
   Children count to eight twice. 1. Place left foot forward. 2. Raise heels. 3. Lower heels. 4. Replace foot. 5–8. The same backward. 1–8. The same with right foot.
5. Balance. *Hips—firm! Heels—raise!* Knees deep—bend! Neck—firm! Hips—firm! Knees—stretch! Heels—sink! *Po—sition!*

6. Abdominal. *Sitting on desks—place! Hips—firm!* Trunk to left—twist! To left—bend! Upward—raise! Forward—twist! Trunk to right, etc. *Standing position—place!*
   To left—bend! Keeping trunk vigorously twisted add a side bend, lowering left shoulder and raising right.
7. Back. Arms upward fling and left (or right) backward fall—out! Po—sition!
   The left-backward-fall-out position is the same as the right-forward-fall-out position, described in Lesson II for Grade VII. At the same time that the left foot goes backward the arms are flung forcibly above head.
8. Jump. Hands for jump—place! Jump over chairs—1!—2!—3, 4!—5!—6! Left about—face! etc.
   See Lesson IV.
9. Respiratory. *Arms sideways—raise!* Arm turning and heel raising—1!—2! *Po—sition!*

GRADE VIII

Lesson VII

1. Introductory. Stretching exercises, three times each—go!
   See Grade VI, Lesson VII.
2. Arch. Arm rotation and chest raising—1!—2!
   1! Raise chest and turn palms outward. 2! Return.
3. Arm. Arm stretching forward, backward, upward and downward—1!—2!—1!—2!—1!—2!—1!—2!
   Any four directions may be used at will of teacher, requiring alert attention of children. If the children are taking this exercise with good strength they may be allowed to go through the eight counts without a separate command for each count; the command would then end with "and downward—go!"
4. Leg and Abdominal. *Hips—firm! Left sideways fall—out!* Feet—change! *Po—sition!*
   Left sideways fall—out! Long lunging step to left with left knee bent to right angles, trunk bent to left so as to make a straight line from right foot to right shoulder, face to front, right foot flat on floor.
   Feet—change! Two counts. 1. Resume erect standing position with a spring. 2. Fall out to right.
5. Back. *Arms sideways—bend!* Trunk forward—bend! Arm stretching upward—1!—2! Trunk—raise! *Po—sition!*
   Arms sideways—bend! Swing arms up to a position resembling the letter E on its back with the child's head representing the middle stroke; the arms are extended horizontally sideways to elbow, which is bent at right angles, forearms and hands pointing upward. In the arm stretching upward note three points: trunk must be kept down, head up, and arms stretched so far upward and backward that child cannot see his hands.

6. Respiratory. Arm raising forward upward with heel raising—raise!—sink!
7. Balance Step. Two step-hops and two waltz balance steps. Mazurka time.
   First measure. Step on left foot (2 counts), hop on left swinging right freely out in front (3d count).
   Second measure. Step on right foot, hop on right swinging left in front.
   Third and fourth measures. Two waltz balance steps.
   Fifth measure. Repeat first measure, and so on.

GRADE VIII

Lesson VIII

1. Introductory. Stretching exercises, three times each—go!
2. Arch. *Arms forward—bend!* Chest raising and arm rotation—1!—2! *Po—sition!*
   Arms forward—bend! Like arms-sideways-bend position (Lesson VII) except that forearms are horizontal, pointing forward from elbow joint.
   1! Raise chest and rotate forearms upward, pivoting on elbow until arms-sideways-bend position is reached. 2! Relax chest and return to arms-forward-bend position.
3. Arm. *Left arm forward upward—fling!* By flinging arms—change! *Po—sition!*
   Hold shoulders and trunk very steady while arms exchange positions by cutting the air with a straight arm swing in forward plane.
4. Leg. Arm stretching sideways with heel raising and knee bending in counts—go! The same three times—go!
   1. Shoulders firm and heels raise. 2. Arms sideways stretch and knees bend. 3. Shoulders firm and knees stretch. 4. Arms downward stretch and heels sink.
5. Balance and Back. *Hips firm and left forward fall—out!* Heels—raise! Heels—sink! *Feet—change!* Heels, etc. Maintain fall-out position carefully while raising heels.
6. Abdominal. *Sitting on desks—place! Shoulders—firm!* Trunk to left—twist! To left—bend! Upward—raise! Forward—twist! Trunk to right, etc. Standing position—place!
   See Grade VII, Lesson VIII.
7. Jump. Hips—firm! Jump with left about facing (or right about facing) twice—1!—2!—3, 4!—5, 6!—7!—8!
   3, 4! Jump facing 180° while in air. 5, 6! Another similar jump. Completing circle.
8. Respiratory. *Arms sideways—raise! Hands—turn!* Arm raising and heel raising—raise!—sink! *Po—sition!*
   Lower arms to horizontal position at the word "sink!"

AGRICULTURAL EDUCATION: TEXTBOOKS

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One striking evidence of the growing interest in agricultural education in elementary and secondary schools is the number of textbooks on agriculture that have appeared in recent years.[1] Of the seventy-five or more textbooks on this subject nearly forty have been published since 1900.

An excellent account of the textbooks of agriculture, including historical aspects, was written by L. H. Bailey in 1903 (146).[2] The present discussion will therefore be confined chiefly to the textbooks published since 1903. In this period of seven years at least twenty-seven textbooks of various kinds have been written. Emphasis should be put on *various,* for the diversity of plan and treatment of the subject in these books makes it difficult to find a basis of classification. They will be considered in this discussion as three types: for elementary schools, for secondary schools, and for teachers.

Most elementary textbooks are informational in character. The subject is generally presented in clear and simple language easily within the grasp of the pupil. It is assumed that the pupil has had sufficient concrete experiences with agricultural matters, and that the text will help him to interpret these experiences. There is a minimum of effort required of the pupil to find out things for himself. Questions are often given at

[1] It is possible that this statement should be qualified, for the number of books published does not indicate the number in actual use. A quotation from a private letter written by the editor of one of the largest publishing companies of agricultural books is significant: "Outside of one textbook published by a Boston house, I do not believe there is another manual of agriculture or agricultural textbook that has paid the publishers anything beyond mere cost, and some have not even paid cost." This was written in 1909. Since then conditions may have changed for there has been a great development of interest in the subject. Besides, thirteen books have been written during and since 1909. It seems likely that the small demand for certain textbooks may be due to the quality of the books themselves.

[2] References by number are to corresponding numbers in the bibliography at the end of this article, or in bibliographies appended to other articles of this series.

the end of each chapter, but they are usually merely a summary of the text, and test the memory rather than ability to interpret. Sometimes experiments are introduced, either in the text or at the end of chapters. But conclusions to be drawn from these experiments are either so implied in the text or are so obvious that the suggested experiments become merely concrete examples or illustrations of discussion in the text. Books of this kind are easily adapted to the prevailing recitation method and consequently are in extensive use (147). Several books have appeared in which the experiment predominates. Here problems and some suggestions as to procedure are given. The pupil is expected to find answers by means of his own investigations. He is supposed to learn to find out things for himself. However, even in otherwise admirable books, induction is often "ready-made for the pupil" (148). This method of teaching by means of experiment does not fit in very well with prevailing methods of teaching Many of the teachers themselves have not had the benefit of laboratory training, and hence know very little of any other than the textbook method of learning or teaching.

Another kind is the one in which agriculture is correlated with arithmetic. Problems for demonstration of the various arithmetical principles relate to agricultural affairs. In the preface of one book occurs the statement, "The pupil will unconsciously absorb and retain many valuable facts and principles relating to agricultural practice"; in the preface of another, the statement, "We trust that this little book, by combining the subjects of arithmetic and agriculture, will be of material assistance to teachers in their efforts to do effective work in both branches" (152, 168).

Perhaps one reason for the number of elementary agricultural textbooks lies in the nature of the subject itself.

> Considered as an industry, agriculture is manufacturing, buying, and selling. It is business. But unlike most other businesses, the operator is producer of the raw material as well as dealer in the products. In order to produce his wares to the best advantage he must know much of the principles in accordance with which the most successful production must proceed. In other words, he must know much of the sciences on which agriculture is

based, as physics, chemistry, botany, and other sciences. But he should never forget that the practice of agriculture is an art and not a science.

These remarks will suggest why it is that there is such a bewildering diversity in plan in the various textbooks of agriculture. One reason why these textbooks have not been more successful in accomplishing the missions for which they are designed is the fact that they look upon agriculture from the academic point of view rather than from the agricultural. Another reason is the attempt to make them "practical" by inserting specific directions for the performing of accustomed farm operations; for these directions must necessarily be of local and temporary application, whereas principles are general and abiding (146, p. 690).

Considered from the standpoint of scientific accuracy most of these textbooks are good, but in some there are inaccurate data, or statements at variance with well-established facts. Considered from the standpoint of pedagogy most of these texts are lacking. The matter is often presented with little or no reference to this important aspect of a textbook. Indeed, some are barely more than abridged encyclopaedias of agricultural information. This general defect may possibly be accounted for when we consider the fact that the authors of all these books, with a few exceptions, are college professors, whose chief interest is in the subject-matter with apparently little interest in organizing material from a teaching standpoint, and giving no recognition to the social possibilities of their subject.

It is probable that the most useful book, at least for the present, will be one that attempts at the same time to awaken an interest in country life and to set the pupil at the working out of specific problems. Mere problems are too "dry" to attract pupils, except now and then under the inspiration of an extra-good teacher. On the other hand, mere information-giving has little teaching value and is not likely to arouse any important enthusiasm for the open country and the farm. On account of the diversity of interests to be served, no single textbook of agriculture can hope to have great leadership in all parts of the country. The thoroughly satisfactory text is apparently yet to be written (102).

The purpose of an agricultural textbook for secondary schools is well expressed in the preface of a recent book of this grade: "to make the teaching of agriculture in existing high schools comparable in extent and thoroughness with the teaching of physics, mathematics, history, and literature." Although some of the elementary textbooks already referred to are being

used to some extent in high schools there are only five books known to the writer that measure up to the standard just quoted. No two of these follow the same plan of treatment. In one laboratory work largely predominates; in another good laboratory exercises follow each chapter; in another some experiments are suggested in the text and among the questions at the end of the chapters; in two no laboratory exercises are suggested except in a general way in the text (151, 165, 170, 172, 175). These are all well written, and where one is used as a textbook the others could be used to advantage as reference books. For a detailed comparison of these textbooks the bibliography should be consulted.

There are three other books which properly belong among secondary textbooks of agriculture but which do not cover the entire subject. "There are those who believe that when agriculture is fully introduced as a secondary subject, it will consist, as in college, not of one but of several courses, each with its distinct and separate text." One of these is a laboratory manual dealing with soils and crops (173); the other two are textbooks, one dealing with fertility of the soil, the other with plant and animal improvement (159, 171).

A third type includes books for teachers. These books deal with the subject from the standpoint of teaching. Five are for teachers in elementary schools (160, 162, 164, 169, 174), and one is for teachers in secondary schools (126). Not much attention has yet been given to the teaching problems of the subject of agriculture, but they are quite as important as the subject-matter.

Referring to elementary agricultural textbooks, L. H. Bailey says: "Efforts enough have been made, but they have fallen short of anticipations. Before textbooks we need teachers; and we must appeal to the child through his interest in nature rather than technically in the farm" (146, p. 696). Elementary textbooks are not nearly so important as elementary teachers. It is to the new teachers who are to have at least a high-school education that we must look to carry agricultural education into the rural elementary schools. It is for this reason that addi-

tional importance is to be attached to instruction in agriculture and country-life subjects in rural high schools. A good textbook with well-selected experiments, although alone not sufficient, is, nevertheless, quite essential to any general introduction and efficient instruction in these high schools.

As this discussion of textbooks of agriculture is really supplementary to one already made by L. H. Bailey (146), his plan of chronological bibliography, with annotations as to contents, will be followed. The two articles will thus bring the subject up to date.

BIBLIOGRAPHY

The references included in this bibliography are of two kinds: one general, the other, of textbooks published since 1903. One textbook, published in 1902 but not mentioned by L. H. Bailey, is also included.

146. "Development of the Textbook of Agriculture in North America," L. H. BAILEY, U.S. Department of Agriculture, Office of Experiment Stations, *Annual Report for 1903*, 689–712.

This article is based on a similar contribution to *Book Reviews*, VII (1899), No. 2, 43–53, but is greatly extended. An abridged discussion of this subject by the same author is found in the *Cyclopedia of American Agriculture*, IV (1909), 379–85.

A historical account of the development of the textbook of agriculture in North America is given, and is followed by an annotated chronological bibliography of forty-five titles, including the first textbook (1824) and all others known to the writer at the time of publication (1903).

147. "Textbooks of Agriculture," B. M. DAVIS, *Nature-Study Review*, V (1909), No. 9, 244–48.

Four types of textbooks are briefly discussed. These are illustrated by reviews of seven textbooks.

148. "Some Textbooks for Secondary-School Agriculture," C. H. ROBISON, *Nature-Study Review*, III (1907), No. 6, 180–85.

The article is introduced by a general discussion of the movement for agricultural education, and is followed by a detailed account and criticism of three well-known textbooks representing three distinct types.

149. *The School and Farm*, CHARLES A. EGGERT, Chicago: W. M. Welch & Co. (1902), 279.

The book is divided into six parts: Basis and Conditions of Farming; Field Crops; Animals on the Farm; Forest; Science and Agriculture; Rural Scenery. Each part is divided into chapters, e.g., Part II into Raising and Rotation of Field Crops; Grain Crops, Corn; Grass, Clover, and Hay; Root Crops, Potatoes; Value of Different Fertilizers; Silos and Ensilage.

150. *First Principles of Agriculture,* EMMETT S. GOFF and D. D. MAYNE, New York: American Book Co. (1904), 248.

"The first part is based on experiments which may be performed in the school or at home. A summary entitled 'What We Have Learned' has been placed at the close of each chapter. These summaries furnish definite statements for pupils to learn, and may be used by the teacher as a basis for drill work."

There are forty chapters: Dead and Living Matter; Soil and Soil Water; Plant and Water; How Plants Grow; Ideal Soil; Soil Fertility; Humus; Clover; Rotation; Saving Soil Moisture; Plant Parasites; Seeds and Soil Water; Air and Germination; Seed Testing; How Seeds Come Up; Value of Large Seeds; Budding; Transplanting; Plant Improvement; The Flower; Crop and Weeds; Garden Orchard; Insect Destroyers; Animal Husbandry; Dairy Breeds; Beef Breeds; Feeding; Horses; Sheep; Swine; Poultry; Bee-Keeping; Home and School Grounds. There is an Appendix of fifteen pages, including various tables, and also directions for Babcock milk-testing.

151. *Agriculture through the Laboratory and School Garden,* C. R. JACKSON and MRS. L. S. DAUGHERTY, New York: Orange Judd Co. (1905), x+403.

The author's aim is to "present actual experimental work in every phase of the subject possible." Contents: Nature and Formation of the Soil; Classification and Physical Properties of Soils; Soil Moisture and Preparation of the Soil; The Soil as Related to Plants; Leguminous Plants; Principles of Feeding; Rotation of Crops; Milk and Its Care; Propagation of Plants; Improvement of Plants; Enemies of Plants; Ornamentation of Grounds. General References, Agricultural Publications, List of Experiment Stations, Publishing Houses, and Glossary follow. For critical summary of this book see 148.

152. *Elementary Agriculture with Practical Arithmetic,* K. L. HATCH and J. A. HASELWOOD, Chicago: Row, Peterson & Co. (1905), 198.

Each chapter is followed by a set of practical farm problems to be used as exercises for arithmetic class. Contents: Growth of Plants; Plant Water; Plant Foods; Soil; Soil and Crops; Wearing the Soil; Legumes; Drainage; The Crop; Insects; Weeds; Farm Stock; Feeding; The Three C's; Dairy; Poultry; Special Crops; Farm Buildings; Accounts; Forestry; Grounds; School Gardening; Home Gardening; Barn Plan and Ventilation.

153. *Elements of Agriculture,* J. H. SHEPPERD and J. C. MCDOWELL, St. Paul: Webb Publishing Co. (1905), 254.

This book is intended especially for use in the Northwestern states. "The course of study follows the seasons: the work on farm crops coming in the fall, that on domestic animals in the winter, and the work on soils and the beautifying of the home and school grounds forms a large part of the course during the spring months."

154. *The First Book of Farming,* CHARLES L. GOODRICH, New York: Doubleday, Page & Co. (1905), xx+259.

The subject is developed by means of experiments as follows: Roots; Soils; Relation of Soils to Water; Forms of Soil Water; Loss of Soil

Water; Soil Temperature; Plant Food in the Soil; Seeds; Seed Planting; Spading and Plowing; Harrowing and Rolling; Leaves; Stems; Flowers; A Fertile Soil; Soil Water; After Cultivation of Crops; Farm Manures; Commercial Fertilizers; Rotation of Crops; Farm Drainage.

155. *Agriculture: Its Fundamental Principles,* ANDREW M. SOULE and EDNA LEE TURPIN, Richmond, Va.: B. F. Johnson Pub. Co. (1907), 320.

"The aim of this book is so to state the scientific facts and principles which underlie the processes of agriculture that they will be intelligible and interesting to young people." Contents: The Soil; The Plant; Soil Improvement; Field, Orchard and Garden Crops; Crop Enemies and Friends; Domestic Animals; Miscellaneous, Including Trees, Tools, Roads, School Gardens, etc. An Appendix giving tables, references, etc., is included.

156. *Rural School Agriculture,* CHARLES W. DAVIS, New York: Orange Judd Co. (1907), vii+267.

"This book is a manual of exercises covering many phases of agriculture" as follows: Plants; Soils and Fertilizers; Corn; Wheat and Oats; Cotton; Feeds and Feeding; Milk; Fruits; Home Grounds; Insects; Spraying. There is a Glossary and an Appendix of useful tables.

157. *Agriculture for Southern Schools,* J. F. DUGGAR, New York: Macmillan (1908), 355.

As the title indicates, this book is intended especially for southern schools, the adaptation being the use of the best practices and materials of southern agriculture for illustration.

The first part of the book deals with plant growth, including the plant's relation to the soil. The second part deals with crops, including enemies (the cotton boll-weevil receiving particular attention), animal husbandry, farm machinery. Important reference tables are arranged in an Appendix.

158. *Elements of Agriculture,* W. C. WELBORN, New York: Macmillan (1908), xvi+359.

This book is prepared for use in southern and western elementary schools. Three phases of the subject are taken up as follows: Crop Production, including the plant and its environment, characteristics of various field crops, soil fertility, etc.; Special Crops, in which the management of each crop is described in detail; Animal Production, including feeding and ration, care of animals, various kinds of farm animals in detail. An Appendix gives a classification of the most common economic plants, plant diseases, and insect enemies of plants and their remedies, score cards for judging, and a Glossary.

159. *First Principles of Soil Fertility,* ALFRED VIVIAN, New York: Orange Judd Co. (1908), 265.

The book is intended for home reading as well as for school use. It is divided into four parts: Plant Food, Its Nature and Source; Making Potential Plant Food Available; Barnyard Manure; Commercial Fertilizers.

160. *Manual of Agriculture for the Common Schools of Illinois,* D. O. BARTO, New York: Appleton & Co. (1908), 52.

"The writer has tried to outline in this little guide sets of studies and exercises in agriculture on topics of general importance and interest to

farmers in all sections of Illinois." The "sets of exercises" are as follows: What Is a Soil? Water; Demands on Water Supply of the Soil; Saving the Soil Water; Effect of Color on Temperature of Soils; Plant and Essentials of Plant Production; Seed; Testing the Seed; Importance of Fine Tilth; Seed Planting; Roots; Root Tubercles; Inoculating the Soil; Plot Experiments; How Necessary Fertilizers Can Be Obtained; Care of Plot Experiments in Vacation; Studies in Corn; Pollination. Two pages of references are given.

161. *One Hundred Lessons in Elementary Agriculture,* A. W. NOLAN, Morgantown, W.Va.: Acme Publishing Co. (1908).

The wide range of topics included in the hundred lessons touches all important phases of agricultural problems. Soils, seeds, gardens, trees, crops, insects, weeds, poultry, foods, birds, machinery, rural civics, and economics—these suggested by titles of prominent lessons—indicate the scope of the book. Much of it is nature-study with agricultural materials and some of it is strictly the technical aspect of the science of agriculture.

162. *Teachers' Manual of Elementary Agriculture, Nature-Study, and Domestic Science,* F. E. THOMPSON, T. S. PARSONS, *et al.,* Boston: Ginn & Co. (1908).

This manual was prepared under the direction of the Colorado Teachers' Association. After an introduction dealing with the educational aspects of the subject follow chapters on Soils, Plant Life, School Gardening and Improving School Grounds, Field Crops, Insects and Birds, Live Stock, and Domestic Science. Five pages are devoted to a Bibliography for agriculture and nature-study work.

163. *Agriculture for Common Schools,* MARTIN L. FISHER and FASSETT A. COTTON, New York: Scribner (1909), xxiii+381.

The book is divided into five sections as follows: I, Soils; II, Farm Crops; III, Horticulture; IV, Animal Husbandry; V, Dairying. There are several appendices. One of these deals with the teaching of the subject with special reference to correlation with reading, arithmetic, geography, etc.

164. *Agriculture in the Public Schools,* LESTER S. IVINS, Lebanon, O.: March Bros. (1909), 156.

This is a handbook for teachers. It includes suggestions for organization of rural schools, teaching of nature-study and agriculture in rural schools, plans for conducting parents' meetings, public displays of school work, corn, potato, and vegetable growing contests, home, rural, and city-school flower gardens, and other valuable information that is intended to be helpful to the teacher.

165. *Elements of Agriculture,* G. F. WARREN, New York: Macmillan (1909), xxiv+434.

"This book is intended for use in high schools, academies, and normal schools, and in colleges when only a short time can be given to the subject." The author has attempted to carry out the suggestions of the Committee on Instruction in Agriculture of the Association of American Colleges and Experiment Stations. All important phases of agriculture are discussed

in the eighteen chapters that make up the body of the book. The text of each chapter is followed by questions, laboratory exercises, and collateral reading. A summary of chap. v, "The Soil," will illustrate the method of treatment which is typical of each chapter: What Soil Is; Rock Particles of the Soil; Soil Water, Including Irrigation and Drainage; Soil Air; Organic Matter of the Soil; Life in the Soil. The chapter is reviewed by means of twenty-four questions. The following is typical: "Where does a fence post rot most rapidly? Why?" Fifteen excellent laboratory and field exercises give concreteness to the text. Ten references are given in the collateral reading. There are twenty pages of appendix containing information useful to teacher and pupil.

166. *Elementary Principles of Agriculture,* A. M. FERGUSON and L. L. LEWIS, Sherman, Tex.: Ferguson Publishing Co. (1909), xvi+318.

The aim of the book is perhaps best expressed by the authors: "Our own ideas are that the primary object of a text on agriculture, intended for the common schools, is to satisfy the natural interest of all children about the *whys* of common farm conditions."

The book is in three parts: Part I deals with the plant, soil diseases of plants, injurious insects, etc.; Part II, with animals, including dairying; Part III is devoted to special topics, such as home lot, school gardens, forestry, etc. There is an Appendix of nine parts, including references, formulae for sprays, tables of nutrients, rainfall, etc.

167. *Practical Agriculture,* JOHN W. WILKINSON, New York: American Book Co. (1909), 383.

This is a "brief treatise on agriculture, horticulture, forestry, stock feeding, animal husbandry, and road building." These subjects are discussed in forty-five chapters. In the Appendix of twenty-two pages are found useful tables and references, and a list of apparatus needed for conducting laboratory courses in agriculture.

168. *A Practical Arithmetic,* F. L. STEVENS, TAIT, BUTLER, and MRS. F. L. STEVENS, New York: Scribner (1909), ix+386.

In addition to the usual aims sought in arithmetic tests, the authors have included "teaching valuable facts by basing the problems of the book upon problems of real life." The book contains a good collection of interesting and valuable applications of arithmetic to the affairs of farm life. Instead of the hypothetical problems concerning what A and B did, occur such problems as, "If kainit contains 12½ per cent potash and muriate of potash contains 50 per cent potash, how many pounds of kainit will it take to supply as much potash as 40 pounds of murate of potash?"

169. *Practical Nature-Study and Elementary Agriculture,* JOHN M. COULTER, JOHN G. COULTER, and ALICE JEAN PATTERSON, New York: Appleton & Co. (1909), ix+354.

This is a manual for use of teachers and normal students. It is divided into four parts. The first part considers the educational aspects of nature-study and agriculture; the second, "a detailed topical outline by grades and seasons of the materials used in nature-study in the training school at the

Illinois State Normal University"; the third, "a shorter outline for work in the lower grades arranged according to seasons, and leading more directly to agricultural studies of the seventh and eighth grades"; the fourth "comprises certain chapters upon general topics; material which has been found serviceable for teachers whose general science training has been slight or lacking entirely."

170. *Agriculture for Schools of the Pacific Slope,* E. W. HILGARD and W. J. OSTERHOUT, New York: Macmillan (1910), xix+428.

This book contains twenty-three chapters devoted to plants and their cultivation. Five chapters are devoted to animals. This emphasis on plants is doubtless due to the fact that horticulture is one of the chief agricultural industries of the Pacific Slope. The living plant in all its relations receives more attention than is usual in an agricultural textbook. The book could very well be used as a textbook of botany. It is illustrated by 209 good illustrations.

171. *Domesticated Animals and Plants,* F. DAVENPORT, Boston: Ginn & Co. (1910), xiv+321.

This is a brief treatise upon the origin and development of domestic races with special reference to the methods of improvement. It is in two parts, one "constituting a brief course covering the essential principles that are fundamental to an understanding of hereditary transmission and of the business of plant and animal improvement"; the other deals with the origin of domesticated races.

172. *Farm Development,* WILLETT M. HAYES, New York: Orange Judd Co. (1910), xii+391.

This is "an introductory book in agriculture, including a discussion of soils, selecting and planning farms, subduing the fields, drainage, irrigation, roads, fences, together with introductory chapters concerning farm business, and the relations of the general science of agriculture."

173. *Manual of Agriculture: Soils and Crops,* D. O. BARTO, Boston: D. C. Heath & Co. (1911), xi+492.

This manual is a series of laboratory and field experiments in two parts, one relating to soils; the other to crops. The work included is considered sufficient to cover one year of the high-school course in agriculture, and is intended to "offer training in science comparable to that furnished by the other science courses in good high schools."

174. *Outlines of Agriculture for Rural Schools,* C. M. EVANS, Chicago: W. M. Welch Mfg. Co. (1910), 31.

A year's work is outlined for rural schools with one lesson each week.

175. *Fundamentals of Agriculture,* JAMES EDWARD HALLIGAN, Boston: D. C. Heath & Co. (1911), xi+492.

"Every subject in this book is written by an expert in his line. This idea was carried out in order to furnish the student with the best information that could be obtained. The editor thought it would be better to have authorities treat of the various topics rather than write the book alone, as there are very few men competent enough to warrant their writing the best

book on agriculture." Thirty-three experts in various fields of agriculture have contributed.

176. *An Introduction to Agriculture,* A. A. UPHAM, New York: Appleton & Co. (1911), xi+270.

The aim of the book is "to touch those matters which would be most useful to the pupils in our rural schools, and especially to give the underlying theory for many farm processes and practices." There are twenty-one chapters and an Appendix. All of the usual subjects of agriculture are covered in these chapters, and the Appendix contains references and a number of useful tables.

MEASUREMENT OF GROWTH AND EFFICIENCY IN ARITHMETIC (*Concluded*)

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Of equal importance with the question of the amount of growth produced by a year's work is that of the permanence of the growth. Table VI gives for Grades 4 to 9 the average scores in the speed tests in September, 1909, the highest scores made at any time during the year, and the scores of the same classes the following September after the long summer vacation. From these the gains during the year, the losses during the summer can easily be computed. The last two columns show the differences between the September tests and the percentage of improvement.

The results are striking and suggestive. The large gains of the fifth and sixth grades are offset by the large losses during vacation, while the growth of the seventh and eighth grades is seen to be relatively permanent. If these results are confirmed by future work, the seventh and eighth grades would seem to be the place in the course where rigid drill on the combinations would be most effective.

At the beginning of the year it was felt by all concerned that there was one question that the year's work must settle, and settle very definitely. Do such short, simple, comparative tests yield reliable results, or would repeated tests give very different relative standings? There is not space here to marshal all the evidence that proves the grade averages reliable measures of grade abilities, but an examination of the results in Table V[1] from this point of view will show how consistently grade after grade has obtained the same score in successive tests. It is to be remembered that all these grades were subject to constant practice in their daily work and drill, so that it is only the before-and-after-vacation scores, or successive scores during a

[1] See *Elementary School Teacher* (March, 1911), 367.

"plateau" that can be expected to be constant. Such scores are, however, remarkably constant. Extended practice, as has been shown, does produce a rise in score, yet but a part of this is permanent, and the abilities in question, slowly built up by hours

TABLE VI

GAINS AND LOSSES

GRADE	OPERATION	SCORE		MAXIMUM GAIN	SCORE	SEPTEMBER 1910 (Loss during Summer Vacation)	GAIN 1910 OVER 1909	PERCENTAGE
		September 1909	Highest		September 1910			
	+	23	39	16	37	2	14	
	−	19	37	16	33	4	14	
4	×	6	22	16	17	5	11	
	÷	7	25	18	17	8	10	
	Average	13.7	..	16.5	..	4.7	12.2	89
	+	35	66	31	47	19	12	
	−	30	54	24	46	18	16	
5	×	24	56	32	34	22	10	
	÷	19	55	36	31	24	12	
	Average	27	..	30.7	..	20.7	12.5	46
	+	43	73	30	56	17	13	
	−	33	58	25	54	5	20	
6	×	30	58	28	42	16	12	
	÷	26	56	30	44	12	18	
	Average	33	..	30.7	..	12.5	14.7	44
	+	53	89	36	79	10	26	
	−	36	69	33	59	10	23	
7	×	41	77	36	64	13	23	
	÷	34	74	40	62	12	28	
	Average	41	..	36.2	..	11.2	25	61
	+	56	85	29	79	6	23	
	−	42	70	28	64	6	22	
8	×	49	74	25	60	14	21	
	÷	41	77	36	67	10	26	
	Average	47	..	29.5	..	9	23	49
	+	67	81	24	71	10	4	
	−	45	64	19	63	1	18	
9	×	56	69	13	68	1	12	
	÷	46	64	18	61	3	15	
	Average	53.5	..	18.5	..	4	12.2	22

of study and drill, must be considered relatively stable quantities. The constancy of very many grade and individual scores in repeated tests proves conclusively that the results obtained from even a single test carefully conducted are reliable measures of grade ability.

On the other hand it is important to state that this is not true of the scores of the individuals composing the grade. Even when the grade average is perfectly constant, individual scores are found to vary. This is shown clearly in Table VII, the individual records in the addition speed test of 23 of the 31 members of the eighth grade. The records omitted are those in which through absence the series was not complete. The graph

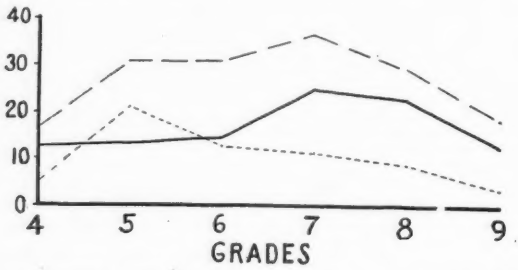

FIG. 11.—Gains and losses for the year. Broken line shows maximum gain—from September, 1909, to highest point reached at any time during year. Dotted line shows effect of summer vacation—loss from highest point reached to September, 1910. Full line shows net gain for year, September, 1910, over September, 1909.

(Fig. 12) makes possible the rapid visual comparison of the changes in the individual scores with those of the grade average, the heavy central line. It will be seen that at such times as the grade average is constant, the constancy is due to the fact that the variations of certain individuals in one direction are offset by the variations of others in the opposite direction. For the individual, therefore, repeated tests are needed to determine his most frequent score and the range of his variation from it.

By far the most important fact to be gained from a study of Table VII is the wide range of ability within the grade. The score of the best girl is on the average twice that of the poorest girl, in spite of the fact that the individuals in this class represent the survivals of eight years of "passing" on a 70 per cent basis. The graph shows plainly that the grade average is really representative of very few scores, and that a measure of the range of variation is needed in addition to the measure of the average performance. The writer has chosen the average devia-

TABLE VII

SCORES IN ADDITION SPEED TEST OF TWENTY-THREE INDIVIDUALS OF EIGHTH GRADE

Rank	September 1909	November	December	January	March 1–18	March 18–30	April 4	April 11	April 18	April 25	May 2	May 9	May 16	May 23	May 30	June 6	September 1910	Rank
1.....	89	85	..	..	86	91	97	98	98	102	..	86	..	105	120	100	88	7
2.....	77	78	80	70	78	57	83	81	77	82	..	85	..	84	91	83	..	10
3.....	69	81	87	91	90	107	107	116	111	..	..	98	..	115	120	109	104	1
4.....	68	81	83	85	90	91	93	94	101	107	..	97	..	104	116	99	92	4
5.....	65	82	77	79	83	84	85	91	85	98	..	90	..	104	100	97	..	5
6.....	64	83	87	94	84	100	100	110	105	107	..	100	..	108	120	106	97	2
7.....	62	55	60	58	64	..	66	74	70	70	..	73	..	73	77	79	74	14
8.....	58	63	68	64	77	72	80	80	73	84	..	80	..	80	88	83	80	11
9.....	57	77	72	76	75	79	83	80	84	90	..	81	..	90	96	86	83	8
10.....	56	77	80	78	80	76	86	85	97	102	..	94	..	105	110	88	90	6
11.....	55	69	75	74	77	82	83	84	87	87	..	85	..	84	83	90	83	9
12.....	52	69	71	77	84	86	90	99	90	94	..	90	..	92	92	100	97	3
13.....	52	60	51	57	..	80	83	80	82	86	..	79	..	80	70	81	72	16
14.....	52	53	75	50	68	60	78	80	82	71	..	66	..	67	77	80	76	12
15.....	51	65	55	62	68	63	73	69	76	77	..	78	..	83	88	82	..	17
16.....	46	51	54	47	57	59	55	64	60	66	..	69	..	62	73	69	..	18
17.....	46	40	39	43	48	47	55	54	60	61	..	62	..	66	71	67	..	19
18.....	44	65	..	60	68	..	72	71	80	80	..	80	..	80	78	83	73	15
19.....	44	58	68	70	67	72	77	..	75	74	..	82	..	75	85	80	76	13
20.....	43	30	50	56	60	59	59	61	55	61	..	58	..	55	52	64	59	20
21.....	35	43	50	27	52	40	53	51	42	..	..	42	..	55	57	51	48	23
22.....	31	30	..	39	42	..	49	57	61	55	..	52	..	54	50	53	49	22
23.....	30	40	45	47	48	58	55	54	50	57	..	57	..	56	55	59	..	21
Aver.....	54	62	66	64	70	73	77	79	79	81	..	78	..	82	85	82	79	..
A.D.....	10.8	14.3	12.2	14.2	11.9	14.5	13.2	14.1	14.3	13.6	..	12.2	..	15.8	17.3	12	12.3	.
Var.....	20	23	19	22	17	20	17	18	18	18	..	16	..	19	22	15	16	..

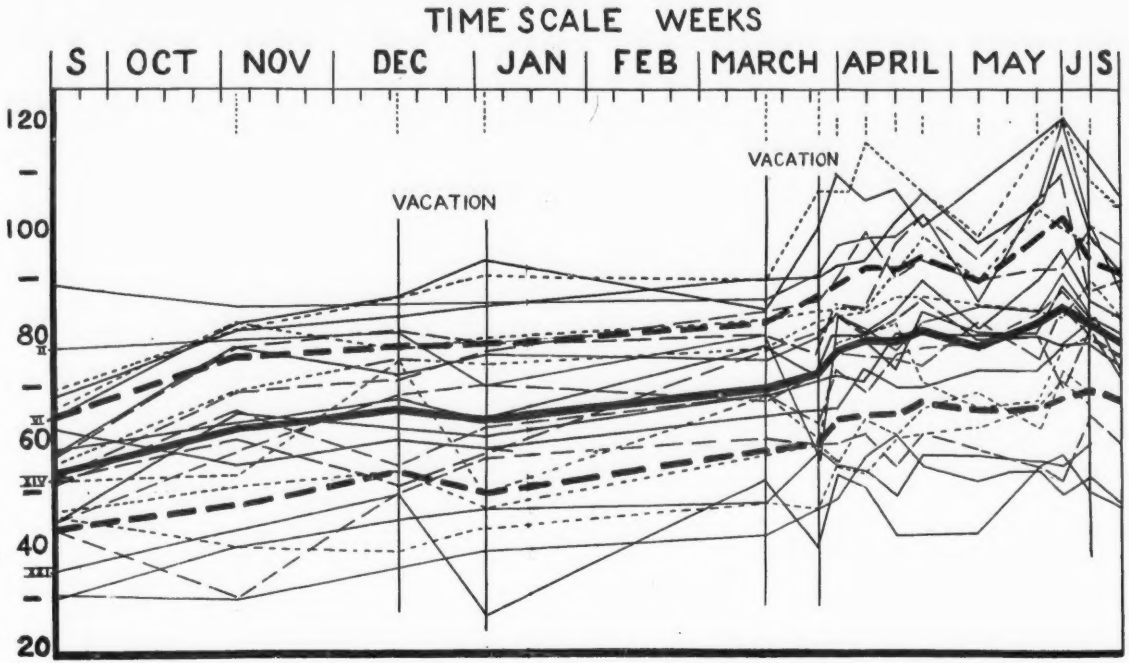

FIG. 12.—Records of twenty-three individuals of the eighth grade in fifteen trials of the speed test in addition from September, 1909, to September, 1910. Full, heavy line shows the average score. Heavy broken lines are at a distance from the average equal to the average deviation. The zone bounded by the two broken lines corresponds to a variability of 18 per cent.

tion, the average difference of the individual score from the grade average, as the measure of variability, and for purposes of comparison the average deviations will be expressed as percentages of their respective averages. The significance of the measure is shown graphically in the plot. On each side of the heavy line representing the grade average, there has been drawn a heavy broken line at a distance from the average equal to that of the average deviation. Between the two broken lines will be found roughly 50 per cent of the class. That is, the exceptionally weak and the exceptionally able have been excluded, and the upper and lower limits of ability of the remainder of the class are given by the broken lines. Because of this wide individual range, therefore, the ability of a class is better thought of as a "zone" than as a single average score. A narrow zone indicates a compact well-graded class, the product of an efficient system of promotion. Unfortunately the zones from the present tests are wide, wider at least than would seem to the writer to be expected in any school that prides itself on its standards, and he would hesitate to publish such results did not returns from other schools using the same tests under the same conditions show zones of the same or greater width. It seems probable that the condition is general in education at the present time. Within the school other tests and measurements make comparisons possible. The variability of the same 23 individual girls whose scores in addition were given in Table VII, and whose variability was there shown to be 18 per cent, was 3 per cent in age, 7 per cent in handwriting (samples measured by Thorndike's scales), 15 per cent in formal English grammar, 26 per cent in height, 30 per cent in memory of important dates and men, 60 per cent in ability to reproduce after 24 hours the main points of a historical passage read once in class.

No one result of the testing work has proved more disturbing to the writer, more startling in its implications, than this extreme variability found in all the grades. Its full significance can be appreciated only by one who has made a careful study of the individual records and then noted the behavior of the same individuals in the classroom. The writer believes weak-

ness and inefficiency are due more to failure to secure complete, all-around development in the fundamental abilities of a subject, and standard growths in each grade, than to any other one cause. Just how inefficient the present conditions are is shown in the case of knowledge of the multiplication tables by the results in Table VIII and Fig. 13. The table gives the average and the average deviation for each of the four grades in all the

TABLE VIII

COMPARATIVE RECORD OF GRADE ABILITY IN MULTIPLICATION SPEED TESTS THROUGHOUT THE YEAR

		Sept. 1909	Nov.	Dec.	Jan.	Mar.	Mar.	April				May					June 6	Sept. 1910
								4	11	18	25	2	9	16	23	30		
5	Av.	24	32	39	40	45	46	43	52	50	52	..	52	..	55	52	55	34
	A.D.	8	9	10	11	12	12	12	13	12	17	..	14	..	12	11	15	9
	Var.	35	29	26	28	26	25	28	25	25	33	..	27	..	21	21	28	27
6	Av.	30	34	49	41	49	50	55	56	..	..	58	52	54	56	56	47	42
	A.D.	10	9	12	15	11	14	15	13	..	..	13	12	17	14	14	14	13
	Var.	35	27	25	37	22	28	28	23	..	..	22	24	31	24	24	29	31
7	Av.	41	43	48	48	62	59	59	..	72	70	68	74	72	77	77	74	64
	A.D.	12	12	11	12	14	14	14	..	15	17	14	14	11	12	16	11	15
	Var.	29	28	22	25	22	23	23	..	20	24	21	18	16	16	21	15	23
8	Av.	49	55	60	56	62	68	67	68	..	..	71	..	74	73	72	72	60
	A.D.	11	9	11	12	10	12	11	12	..	..	12	..	15	10	14	12	13
	Var.	22	18	18	21	17	18	17	18	..	..	18	..	20	13	19	17	21

multiplication tests of the year. The graph shows the zone of ability of each grade shaded in such a way that ground common to two or more grades can be detected at once. The overlapping of grade upon grade is such that for two-thirds of the year a part of the territory is common to *all four grades,* while a large part of it is at all times common to three grades. The table and figure together make very plain the complete breakdown of the *grade* idea. For it is to be remembered that the zones do not include the extremes, but the central core of the class only. In other words, the variations of individual ability within the grade are far greater than the increase of knowledge or ability from grade to grade. It will be seen, therefore, that just so far as these conditions are truly general, the problem of the degree of variability that can be permitted within a grade is a vital one for graded systems.

The cause of such breakdown of grade standards is to be

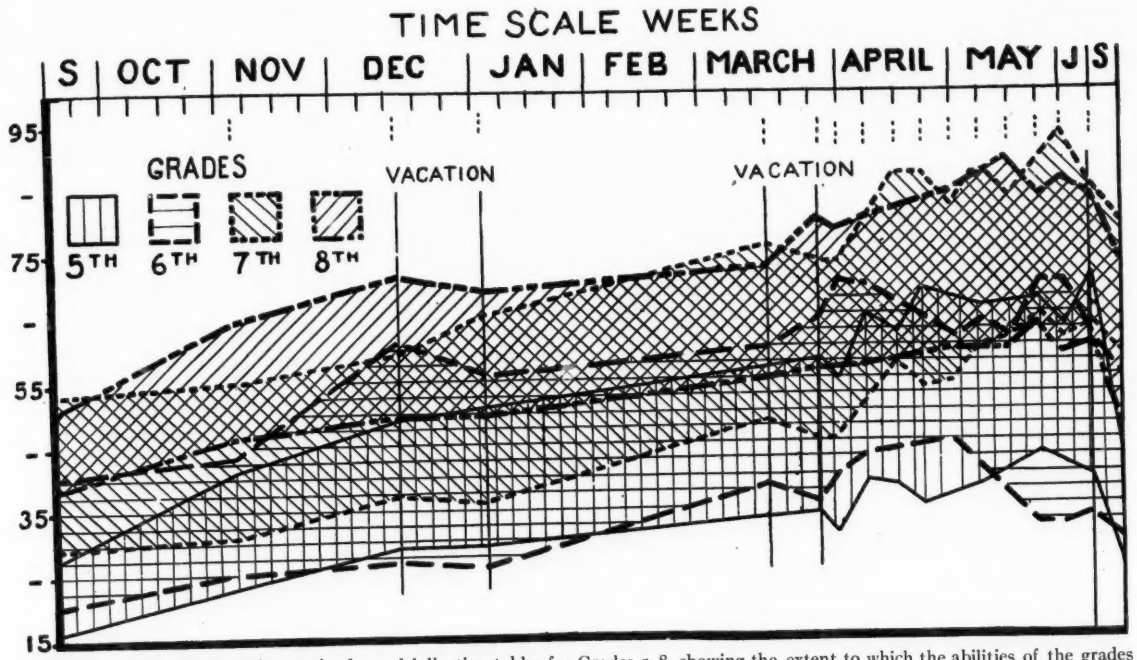

FIG. 13.—Record of year's tests in the multiplication tables for Grades 5–8, showing the extent to which the abilities of the grades overlap. The "zone" of ability for each grade is determined by the grade average and the average deviation from it. Within a zone, therefore, are included merely the abilities of the central core of a class; roughly, the half of the class nearest the grade average.

found in the inherent differences in individual children. Consider the effect of vacation, for instance. In Fig. 12 it will be seen that as a whole the grade score fell slightly during the Christmas vacation and the variability increased, while the opposite was true of the spring vacation. Individuals 2, 14, and 21, however, are consistently demoralized by both vacations. Individual 6, on the other hand, shows just the opposite effect, while some of the others are very slightly affected if at all. One looks in vain for *any* constant effect during the year. The test the last week in May is particularly interesting as bearing on this point. It represents the trial of a new test, similar to the old but better balanced as to units. To many children it proved much easier, but there were individuals in every grade to whom it seemed more difficult, and in the case of the eighth grade the variability was correspondingly increased. From the point of view of the year's growth the same thing is evident. The grade work that enabled No. 12 in rank in September, 1909, to become No. 4 in September, 1910, and No. 18 No. 12, changed the relative rank of other members of the grade very little, while there are a few whose absolute score also shows but little improvement. In other words, education is an individual matter, and no grade instruction nor group work can possibly be devised to minister adequately and efficiently to the widely differing needs of any group selected under the present system.

The writer, however, is not one of those who believe that the needs of the individual will bring about the abolition of our present graded system. The necessity for handling large numbers of children and the many benefits that accrue from group work make its continuance a certainty. At the same time the differences in individuals make it imperative that each child receive the kind and amount of instruction that his particular mental makeup demands. These two conditions can be met by having for each subject and each grade standard scores and standard growths in all those component abilities that are fundamental. Individual measurement by standard tests and constant checking of the results of classwork, supplemented by individual prescriptions of study and work, would insure the

attainment of any desired degree of minimum ability, and still leave room in the nonessentials of the subject for all those permissible individual variations which make for personality. If education is to become either scientific or efficient, more attention must be given to accurate determinations of both the material to be acted upon, and the effects produced. In the future it may well be that a testing department will be a vital part of every well-organized school system.

One other question will briefly be discussed, the correlation between the elemental abilities and the complexes of which they form a part. The question of how far drill on the multiplication tables, for instance, must be carried in order that a child may be able to multiply correctly in the solution of problems is one of some importance. Although in all discussions based upon the present tests the defects of the tests themselves and the consequent possible unreliability of the results must be kept in mind, two correlations attempted seem to yield results of value.

The first is the relation between rate of motor activity and total score in the speed tests. It seemed reasonable to suppose that a child able to copy figures more rapidly than another would obtain higher scores in writing the combination, even though the two children really had equal knowledge of the tables. To test this point the June scores of 182 individuals of all grades above the third were thrown into one large group and distributed on the basis of their scores in copying figures. The average total score in each of these smaller groups was then determined. Figure 14 shows the results graphically. It is evident from the curve that there is a very close connection between the two types of scores up to a certain point, but that beyond this point the ability to copy figures with extreme rapidity does not carry with it the corresponding ability to obtain a high score in the other speed tests. This critical score, therefore, approximately 115 figures in a minute, has been taken by the writer as the standard to be reached before the work in arithmetic is completed. Standard scores, graded down from this maximum, have been set for the other classes below the eighth, and the attempt is being made by classwork and by

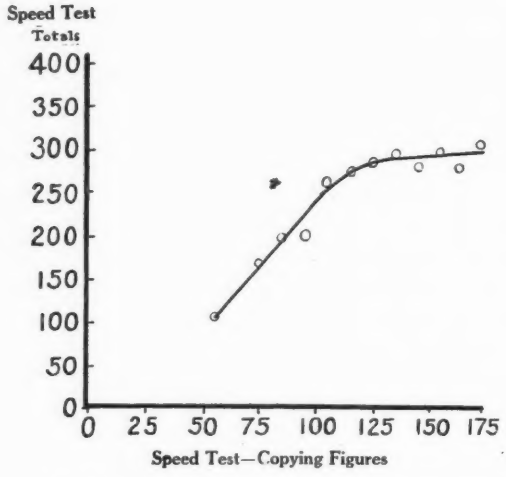

FIG. 14.—Correlation between speed in copying figures and total scores in the speed tests.

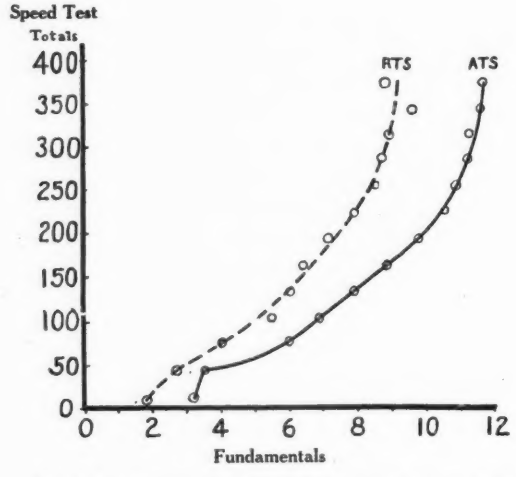

FIG. 15.—Correlation between total scores in the speed tests and the number of examples attempted and right in the test on fundamentals.

extra special individual work to bring the score of every individual up to the score for her grade. By thus securing a standard growth in each grade, the final maximum ability will be insured.

A second correlation of some importance is the relation between total scores in the speed tests and the scores in the tests on abstract examples. Figure 15 gives the results both for examples attempted and for examples right. The general form of the curves is the same. That is, there is probably a critical degree of knowledge of the tables to be attained by drill beyond which an increase in score does not carry with it an increase in ability to work examples. The determination of the proper balance between these fundamental abilities of a subject affords a large number of important problems for experimental work.

No general summary of the points made in the foregoing discussions will be attempted. The writer feels, however, that the work of the year has proved conclusively the necessity of measurements of individual needs and individual growth, as well as the great possibilities of comparative tests from the standpoint of intelligent determination of courses and methods. It has also made possible the construction of tests composed of units of known values, so that future measurements will be free from this source of error. The immediate work of the future is, therefore, the determination of standards for each grade and of standard growths. It must also settle the question of whether or not the teacher will be able, by use of the knowledge gained from the tests, to bring individuals up to standard scores. It is with these questions that the experimental work of the school during the coming year is to deal.

THE HANDWRITING OF SCHOOL CHILDREN

SUPERINTENDENT G. M. WILSON
Connersville, Indiana

Last fall an attempt was made to secure samples of the *ordinary* writing of all pupils and teachers in the Connersville (Ind.) schools. About 1,200 samples were secured under conditions that gave, for the most part, the *ordinary* writing. These samples were then graded according to the Thorndike Scale A,

TABLE I

Grade	Speed (Letters per Minute)		Quality (Thorndike Scale A)
	Median	Range	
1B	22	8– 26	9.2
1A	9	5– 19	9.5
2B	17	7– 45	10.1
2A	14	7– 30	10.4
3B	20	10– 54	9.9
3A	36	9– 66	10.3
4B	48	14– 86	10.2
4A	60	29–131	10.
5B	51	30– 84	10.2
5A	52	28– 84	10.3
6B	71	43–100	11.4
6A	60	43– 87	11.7
7B	58	22– 91	11.4
7A	55	31– 95	11.7
8B	86	54–108	11.2
8A	74	26– 96	11.
9th year	81	48–119	11.7
10th year	91	69–120	11.8
11th year	100	91–211	11.5
12th year	108	78–150	11.8
Teachers	98	76–126	12.9

for Handwriting. The speed per minute was noted. The work was graded by three judges. A full exhibit by building and judges would be interesting, but space will permit only a brief summary.

This study showed us the actual conditions existing in our writing work. It showed what was being done. The questions

naturally arose, Is this as it should be? What is the correct standard for each grade in our schools? Accordingly a table was constructed indicating a *tentative* standard for each grade as follows:

TABLE II

Grade	Speed (per Min.)	Quality (Scale A)
1A	12– 16	8–10
2B	15– 20	8–12
2A	15– 25	9–12
3B	15– 30	9–12
3A	25– 40	9.5–13
4B	30– 55	10–13.3
4A	40– 65	10–13.6
5th	45– 65	10–14
6th	50– 70	11–14
7th	50– 75	11–14.5
8th	55– 75	12–15
9th year	55– 85	12–16
10th year	60– 85	12–16
11th and 12th years	65–100	12–16
Commercial H.S	65–100	13–18

The teachers were asked to co-operate with the writing supervisor in testing the standards indicated. The quality last fall (Table I) was practically the same in all grades. The question arose, May we not expect to reach a higher quality in upper grades? The low speed in the lower grades indicated a slow *drawing* of the letters and a *finger* movement which greatly sacrificed speed. Question, Should we not increase the speed in lower grades? A fact not showing in the general summary but which did show in the detail of rooms and buildings was that a grade here and there stood out far in advance of the same grades in other buildings or of the grade above or below in the same building. Did this not indicate that it would be possible to secure and maintain a higher standard of writing both as to speed and quality by giving more attention to it?

In attempting to answer the above questions and prove the correctness of our tentative standards as shown in Table II tests were made in grades 3A, 4A, 5A, 6B, and 6A. In each instance the work was graded by three judges, one of the judges being different in each grade. As the work proceeded, the chief

question came to be, *How is quality affected by speed?* The results in the 6A grade are representative.

		Average Speed (Letters per Min.)	Average Quality (Scale A)
Speed and quality in Writing, 6A Grade	Slow writing.....	$46\frac{1}{2}\frac{7}{1}$	$14\frac{3}{4}\frac{8}{0}$
	Natural writing....	$73\frac{3}{2}\frac{}{1}$	$14\frac{7}{4}\frac{8}{2}$
	Rapid writing.....	$82\frac{7}{2}\frac{}{1}$	$14\frac{5}{4}\frac{}{2}$

The tests point strongly to the conclusion that *speed may be secured without any sacrifice of quality,* at least in intermediate grades.

This conclusion is borne out by an experience extending over five years in the St. Louis public schools, where speed by the muscular movement is a main object. Supervisor H. C. Walker writes me:

> We have but one rate of speed in all the grades. In the primary grades the pupils practice oval exercises at the rate of about 180 revolutions a minute. This sets the standard of speed that is used in the writing and while the letter formation is sacrificed to some extent we notice that the pupil's control improves as he passes through the grades.
>
> We place as much stress on the manner in which the writing is done as we do upon the immediate result in the formation of exercise or letter. We have been following this plan very successfully for about five years and at present have a number of second-grade rooms where the pupils write as freely and almost as accurately as we are able to find in the intermediate rooms.

In the light of this experience and our own tests, it appears that our tentative standards (Table II) were much too low as to speed in the lower grades. A minimum of 60 or 70 letters per minute for all lower grades and a minimum of 80 to 100 letters per minute for the upper grades and high school appears to be nearer the correct standards.

It further appears that in order to prevent constant dropping to lower standards, the writing work must be reinforced at every point in the school work and not left entirely to the writing period and the writing supervisor. Good writing should not be confined to the writing period. The teacher should expect good writing in all lines of school work and should accept no work in which the writing falls below the minimum stand-

ard. This will require that the teacher provide sufficient time for written work in order that the writing may be good, and this will doubtless mean less written work on the part of pupils. It will mean avoiding the rush and hurry incident to much of our school work. It goes without saying that the board work of teachers should show the correct form combined with a high quality of excellence.

In conclusion, we must continue our study. We have at least indicated a *method* of investigation, and that is worth more than the energy in time and effort expended on our study. Let us continue to collect evidence until we have enough evidence to justify an opinion.

EDITORIAL NOTES

Dr. Brown's Resignation

The withdrawal of Dr. Elmer E. Brown from the Commissionership of Education may very properly be made the occasion of comment on both the office and the man. Dr. Brown has done much to make the reports issued by the Bureau of Education more valuable to all who seek information on educational matters. The reports of the Commissioner have appeared very promptly at the opening of the year. The tables have been modified in such a way as to make the facts more accessible. Digests of the statistics have been prepared which set forth the meaning of the technical matter in easily comprehensible form. A series of separates covering vital interests has been issued from time to time by well-qualified specialists. The library of the Bureau has made its material more than ever available to students. For all this steady and helpful improvement of the Bureau, the educational world owes much to Dr. Brown.

Need of Educational Research

Discouragements have arisen because of the attitude of Congress. Dr. Brown launched a campaign for more research funds. His plans were comprehensive and contemplated work on the part of the federal government in the investigation of schools and other social institutions which contribute to education. The need of investigations of this type was not regarded by Congress as sufficiently imperative to warrant appropriations. The number of people who are directly affected by educational legislation is comparatively small as contrasted with those affected by the work done by the federal government in agriculture. Yet it is difficult for this smaller group of professional educators to see how the country at large can fail to demand some more highly organized educational investigations. Dr. Brown has done a large service in interpreting his office as responsible for investigation. The Bureau must be aggressive in its collection of information. It has been

more aggressive than ever before under Dr. Brown. It is to be hoped that the next commissioner will follow this part of Dr. Brown's program with vigor.

Educators Must Co-operate with the Bureau

The call of a single institution was strong enough to take an officer from a government bureau. New York University is to be congratulated on securing the services of a man of national reputation and high scholarly attainments and standing. The Bureau of Education ought to be a place of such influence and dignity that no one could find a larger sphere of influence than the headship of this Bureau. The frank fact is that the Commissioner of Education does not have at the present time a position of the dignity and influence which he should command. For this state of affairs, those who have charge of schools are responsible. Superintendents and teachers should make it clear to their representatives that there is a desire—a widespread demand—for educational investigations. There is at the present time too little interest on the part of teachers in the service which the Bureau renders. A representative at Washington of a district where the publications of the Bureau are little used is not likely to initiate a movement for the enlargement of the Bureau. The educators of the country must make known in unequivocal fashion their demand for the enlargement of the Bureau. Dr. Brown undoubtedly saw before him at New York University a more congenial opportunity. The lesson to be learned from his resignation by all who are interested in the Bureau is not obscure. It is to be hoped that the Bureau may soon receive the support which will make it what it should be.

BOOK REVIEWS

Problems in Wood-Turning. By FRED D. CRAWSHAW. Peoria, Ill.: Manual Arts Press. Pp. 35 and 25 plates. $0.80.

Written as a textbook for students, this volume is also an excellent reference book for teachers of wood-turning. The author has succeeded in giving a series of lucid descriptions of the manipulation of wood-turning tools, in arranging progressively the several processes, in illustrating interesting applications of these processes to useful articles, and in setting forth logically such principles of design as are inherent in this relatively inartistic or non-artistic branch of woodworking.

The accuracy tests and puzzle rings are ingenious and interesting and the useful models shown are exceptionally well designed and suggestive of development by the individual pupil.

As to the book itself the arrangement is good, the illustrations are well drawn and illuminating, and the plates are unusually good examples of well-dimensioned working drawings.

FRANK M. LEAVITT

What to Do at Recess. By GEORGE E. JOHNSON. Boston: Ginn & Co., 1910. 12mo, cloth; 33 pages; illustrated. 25 cents.

This practical little book is rich in profitable suggestions for making good use of play periods. It is addressed to teachers, but will also prove an excellent first handbook for people who have charge of recreation centers anywhere. The needs and enjoyments of children of primary, intermediate, and grammar age are taken up separately. Brief explanations of many games are given and simple forms of playground apparatus are discussed. The book is easily read and will commend itself to those busy people who wish to get this kind of information in condensed form.

J. ANNA NORRIS

The Building and Care of the Body. By C. N. MILLARD. New York: Macmillan, 1910. $0.40.

This book emphasizes primarily hygiene and hygienic habits of life in discussions that are simple and clear and easily applicable to the daily experiences of children in the fourth, fifth, and sixth grades, for whom it is especially intended. In addition to sections on the various aspects of personal hygiene, food, air, exercise, care of special sense organs, etc., there is a good chapter on the care of younger children, and one on the simplest elements of first aid to the injured.

A small amount of anatomy is incorporated where it will aid in clearness

of discussion. In this connection it may be regretted that in so useful a book a few technical errors have crept in, as the repeated use of the term "expansion" of the diaphragm when "contraction" is plainly intended. Also the drinking of water with meals is categorically condemned although there is much authority for the opposite contention.

J. A. N.

The Reasoning Ability of Children of the Fourth, Fifth, and Sixth School Grades. By FREDERICK G. BONSER. New York: Teachers College, Columbia University, 1910. Pp. 133.

This monograph gives the results of an experimental study of the abilities of 757 fourth-, fifth-, and sixth-grade children of Passaic, N.J., to use what the author regards as the "most fundamental four phases of reasoning activity," namely, "controlled association, mathematical judgment, selective judgment, and the complex analysis and synthesis found in literary interpretation."

For the test of mathematical judgment fifteen easy problems involving knowledge to be expected of the children were given: for controlled association, (1) a list of twenty sentences requiring that appropriate words be substituted where blanks occurred, (2) twenty sentences requiring the choice of a right or wrong word to make proper sense in each, and (3) sixty words requiring opposites; for selective judgment, (1) the choice of the right reasons from a variety of reasons why certain things are so, and (2) the selection of good definitions from a number of definitions of objects; for literary interpretation, the telling or giving the meaning of two stanzas of poetry.

The author reaches the conclusion that the above tests are valid tests of native reasoning ability, as there is a "progressive development through the grades," as the younger children of a grade are uniformly superior to the older, and as there are "substantial percentages of the lowest grades represented in the highest quartile of ability of all." Mr. Bonser says that the conclusion which is of the greatest pragmatic value is the one drawn from the last two results stated above—that "the worst type of retardation is that which withholds appropriate promotion from those who are the most gifted, therefore of most significance as social capital."

The tests show careful preparation, the conditions under which they were given were kept uniform, and the presentation is thorough and clear. Were the results given in percentages as well as in terms of median abilities the comparison of the tests with each other could be more readily noted. However, the table of correlations brings this out fairly well. Mr. Bonser's results certainly make clear that there is a wide variation in ability in each grade and force the conclusion that the teaching and management of the schools are not meeting the conditions.

Whether the tests employed by the author are adequate for determining the status of reasoning ability is a different question. Can we say that mathematical and selective judgment, controlled association, and the analysis and synthesis found in literary interpretation are the "four fundamental phases of reasoning ability"? Are not the formulation and testing of hypotheses, the establishment of general conclusions, and their verification quite as fundamental?

The motive for reasoning, implicit or explicit, is found in a problematical situation which confronts the individual. Mr. Bonser's tests do not afford this except in a highly artificial and static form. The very fact that the time taken by the first pupil in the room to complete the exercise was made the time limit for all pupils vitiates the value of the test as one for reasoning and makes it rather a test for knowledge and habits that have become automatized. Mr. Bonser comments upon this but does not think that the value of the test for reasoning is lessened thereby. Certainly there must be a stock of knowledge and ability to control associations before reasoning in a given situation can take place, but the mere recall of knowledge through associations is not necessarily a test of reasoning ability, nor does it follow that the associations were built up as a result of reasoning.

The selective judgment and literary interpretation tests are better adapted to call forth reasoning than the controlled association and mathematical judgment tests, but the same objections to the imposed time limit and the lack of a problematic situation apply here also.

The author draws the conclusion that since the younger children in each grade score more points than the older, and since a good percentage of the lower grade children reach the highest quartile of all, the tests are of native as well as of acquired ability. In Test III for controlled association there is such a small gain from grade to grade, and for the younger over the older that it is barely noticeable. This may indicate that the knowledge required by the test was acquired early and had reached a high degree of automatization in the lowest grade. On the other hand, Test IV for controlled association shows a marked gain from year to year and for the younger over the older, and may be interpreted as meaning simply that the information necessary for the solution of this test had not yet been acquired as habit in the lower grades. The fact that there is a marked gain in Grade 5B over 4A for both younger and older children may mean that this information was a part of the teaching of Grade 5B.

There is only from four to six months' difference between the average age of the younger 25 per cent of Grade 4A and that of Grade 5A, and three months between the older groups of the same grades. Despite the small difference in age Test IV shows an appreciable difference in ability between these two grades, being about the same for the younger as for the older groups. This would seem to indicate that the difference is due largely to school training.

Perhaps the effects of retardation have not sufficiently entered into the author's conclusions. Making the very liberal allowance of three years to a grade, eight to eleven years for Grade 4, and so on, from 30 to 40 per cent of the children are above age. Taking the ages nine to ten for Grade 4, ten to eleven for Grade 5, and eleven to twelve for Grade 6, out of 757 children only 20 are below the normal age. Hence the younger 25 per cent represents the normal-age group, while the older 25 per cent consists of very much retarded children. The difference in ability found between the younger and older groups does not necessarily indicate that these tests are of native reasoning ability; they may be interpreted as simply indicating that the normal-age or younger group was able to automatize acquired knowledge more quickly than the older, retarded group.

In a study of this kind information in regard to when and where the children received definite training along the lines of knowledge required by the tests might

throw some light upon the interpretation of the results in terms of native and acquired ability.

The conditions under which the author worked seem to the reviewer to be too complicated for obtaining valid information concerning the reasoning ability of children. Children should be studied in groups of the same age and ability. Individual records should be kept. A suitable situation should confront the children involving a problem known to be new to them and for the solution of which they have an adequate stock of old knowledge. The reasoning process itself must be studied as well as the results of learning, for the learning may or may not have involved reasoning.

M. A. GRUPE

THE UNIVERSITY OF CHICAGO

CURRENT EDUCATIONAL LITERATURE IN THE PERIODICALS[1]

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Librarian, School of Education, The University of Chicago

ADDISON, J. T. Young China in the classroom. Out. 97:787–91. (8 Ap. '11.)

ANDREWS, CHARLES. Education: the next phase. Educa. 31:512–18. (Ap. '11.)

BENSON, HARRIET. A girl at Heidelberg. Out. 97:782–87. (8 Ap. '11.)

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[1] *Abbreviations.*—Amer. Educa., American Education; Educa., Education; Educa. R., Educational Review; El. School T., Elementary School Teacher; Harp. W., Harper's Weekly; Journ. of Educa. Psychol., Journal of Educational Psychology; Journ. of Home Econ., Journal of Home Economics; Lib. J., Library Journal; Lit. D., Literary Digest; Liv. Age, Living Age; Out., Outlook; Pop. Educator, Popular Educator; Pop. Sci. Mo., Popular Science Monthly; Psychol. Clinic, Psychological Clinic; Pub. Lib., Public Libraries; School R., School Review; Sci. Amer., Scientific American; West. Journ. of Educa., Western Journal of Education.

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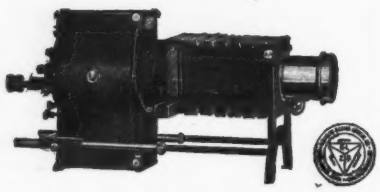

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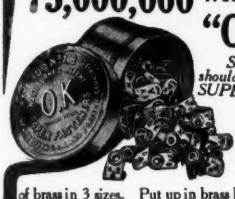

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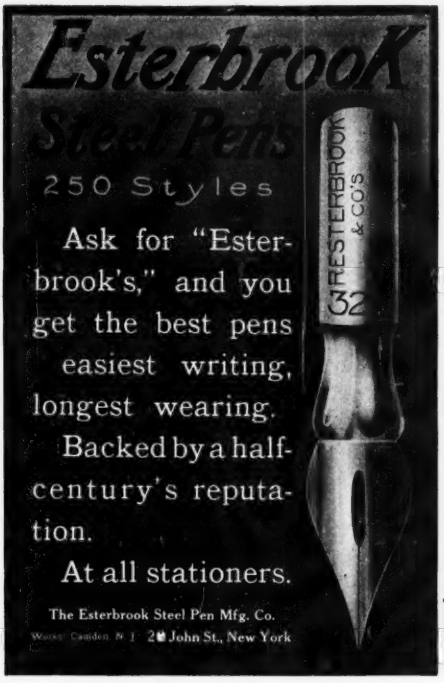
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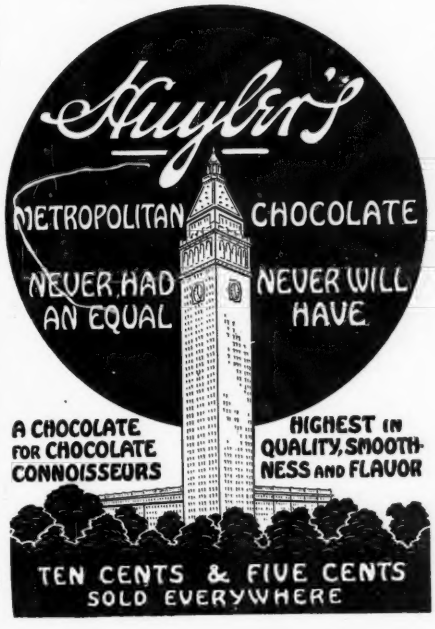

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